TPRS Quarterly Report

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President's Report

Tom McDermott, N5EG

Once again, Hamcom tops the list of activities. This year, **Hamcom will be held on Friday and Saturday, June 11th and 12th, 1999** at the Arlington Convention Center. The activities start at 1 PM on Friday, when the inside exhibit booths open. The Saturday schedule will be the same as in years past. The schedule modification will allow the commercial exhibitors to pack up on Saturday night and head home on Sunday. You can look at the Hamcom website at http://www.hamcom.org for complete program details, maps, event schedules, programs, etc. Also, you can download an abbreviated version of the Hamcom newsletter in PDF format from the site - it's pretty cool. The Hamcom newsletters (25,479 of them) were mailed last week, but being newsprint they take a long time to arrive. A special event this year will be a presentation by Riley Hollingsworth, K4ZDH (a.k.a.: "The Enforcer") from the FCC. Riley has re-invigorated the FCC's amateur enforcement activities, to the absolute delight of many, many hams. The other programs will cease from 1:00 - 3:00 PM on Saturday in order to allow everyone to attend the program by Riley.

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TPRS

Quarterly Report

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Accordingly, the TPRS digital and packet programs have been shortened this year, and we will fit them all into the morning. This year we have tried something a little different in program scheduling. The first program will be on Linux and tools for amateur use. This is followed by a program on APRS. The next two programs are complementary, a demonstration of multimedia (audio, video, text, viewcells) in real-time over an IP network. This is followed by status on Spread Spectrum, and a discussion of real-time IP over the TAPR spread spectrum radio project. While we are not able yet to demonstrate the radio (still a lot to do), the concept of providing real-time IP connectivity over a radio, and the applications that are possible can be demonstrated. Hopefully, this will be an entertaining program since there will be a lot of demonstrations during the morning session. At 12:15 the TPRS annual meeting will be held. We have to finish this up well before 1:00 PM to allow the room to be reconfigured for the FCC presentation.

- 9:00 - 10:00 Allen Finne, KB5SQK "Linux and Tools"
- 10:00 - 10:45 Mike Heskett, WB5QLD "APRS and Demo"
- 10:45 - 11:30 David Dennis, N5BOC "Multimedia over IP"
- 11:30 - 12:15 Greg Jones, WD5IVD, and Tom McDermott, N5EG “IP over SS, Spread Spectrum update"
- 12:15 - 12:45 TPRS Annual Business Meeting

The programs this year will be held in meeting rooms 6-8, which will provide us about twice the amount of room as in previous years. In the last couple of years, the morning sessions have been standing-room-only, hopefully the larger room will allow everyone a chance to sit down.

We have several people who have volunteered to run for director of TPRS, and nominations are solicited. You can send in your nomination by email or by mail. There is a form in the issue for

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director nominations if you wish to use that. The directors determine the direction and policy of the organization, and they also elect the officers of TPRS. So be sure to nominate (and vote) for your candidates. There are 3 positions open this year. The following director terms expire during the June meeting:

- Bob Morgan, WB5AOH
- Jim Neely, WA5LHS
- Tom McDermott, N5EG

TPRS has a total of 5 directors, two are elected on even years, and three are elected on odd years. All of the director terms are for a period of two years. The other two directors, whose terms expire in June 2000 (hopefully, these guys are Y2K compliant!) are:

- Joe Borovetz, WA5VMS
- Dave Wolf, WO5H

Some breaking news is that we might be able to acquire some sort of land-line connection to replace part of the circuits that were lost to west Texas about a year ago. The information is pretty preliminary, hopefully we'll be able to fill you in on more information during the TPRS business meeting, and in the next issue of the Quarterly Report.

I had the opportunity to attend the IETF (Internet Engineering Task Force) meeting #44 in Minneapolis in March. The IETF drafts the standards used in the Internet (in Internet terminology they're called RFC - Request For Comment). All of the standards, proposed draft standards, and in-process documents are available from the IETF web site, http://www.ietf.org . One of the interesting things happening at IETF is the emergence of Quality-of-Service (QoS) within the Internet. QoS allows for different service characteristics to be applied to different types of IP packets within the routers of the Internet. Most people look at QoS to provide a couple of different services: 1) high-quality data services for corporate customers who are willing to pay for the privilege (sometimes known as Gold service, Silver service, etc., and 2) special real-time delivery of certain types of packets (as opposed to traditional best-effort packet delivery). What we're interested in as Amateurs is probably the second definition of service.

Today's Internet does not make any distinction between different types of traffic. All traffic is known as "best-effort" traffic. This means that a best-effort is made to relay the packets, but that these packets can de dropped or delayed as any intermediate router determines it is necessary in order to shed congestion. If we look at the two types of traffic, best-effort, and real-time, we see that the needs of these two types of packets are fundamentally different in the network. File-transfers, web-page browsing, etc., are best-effort traffic. In the Internet our PC's run a protocol known as TCP, which transforms the best-effort circuit into a reliable circuit. It does this by adding sequence numbers and other overhead to each packet. Then, if the Internet loses one of these packets, the PC will retransmit the packet. At the receiving end, the PC inserts these retransmitted packets back into the proper position (and deletes any duplicated packets) before sending the packets to the target application on the PC (such as a web browser).

Real-time packets on the other hand, are packets representing things like samples of a voice conversation, a video transmission, etc. If one of these packets is lost or delayed, it is not useful to retransmit the packet. If it were retransmitted, we would have to hold-up all the other packets that should be played-out after it. This would add an unacceptable delay to the audio being transmitted. Thus, while we can acceptably lose *a few* of these real-time packets (and maybe replace them with *silence*), we would like the delay to be bounded for all of the ones that do get through. Typically, voice should not be delayed more than 250 milliseconds round-trip, or else it begins to become difficult to hold a conversation.

The currently proposed solution to these two different traffic requirements is a proposal called Diff-SERV, it stands for "differentiated services". In IP routers, all packets are buffered in memory while awaiting availability of bandwidth on the output link

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of the router. DiffSERV provides multiple queues, or FIFO's, in the router. The reason for providing the FIFO's is that sometimes too much traffic arrives at a router that all wants to go to the same output port at the same time. If we did not provide a buffer, we would have to throw away some of these packets, thus making the loss rate of packets much too great. The buffers allow us to ride-through the peaks of traffic, which keeps the loss rate low, but at the expense of temporarily increased traffic delay in the router. DiffSERV provides different queues for different types of traffic. The real-time traffic is put into a different queue than the best-effort traffic. Then, when a big crush of best-effort traffic arrives, the real-time traffic is give temporary priority in the router. This means that the real-time traffic will not experience the increase in delay. The best-effort traffic will experience the increase in delay. We just have to be sure that best-effort applications don't care about an extra half-second of delay in a router (for example, web browsing and file transfers aren't so sensitive to this kind of delay increase).

Applications will have to need to know how to mark which packets are real-time, and which ones are best-effort. They also will need to inform the Internet about how much real-time traffic they will be sending so that not too many people try to use the higher priority at the same time. Two protocols, MPLS (Multi Protocol Label Swapping) and RSVP (Resource Reservation Setup Protocol) provide for this type of notification. These two protocols are in various stages of standardization within the IETF, and experiments are being run by various suppliers of router products to verify performance, delay, packet loss-rate, and interoperability between vendors. We can expect some of the routers in the Internet to upgrade to these new capabilities over the next several years.

Since the theme of the Packet programs at Hamcom is Multimedia over radio, it's important to us that our Internet services begin to acquire DiffSERV capabilities. One of the design objectives of the TAPR spread-spectrum radio project is to provide support of differentiated queuing and mini-

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Texas Packet Radio Society, Inc.

TPRS was founded in 1985 and is an educational, public service, and scientific research non-profit corporation. Texas Packet Radio Society goals are:

1- design and research amateur radio packet networks
2- provide education in the area of general packet usage

To accomplish better communications in the region, TPRS has been organizing statewide working groups to cover various networking topics. The current working groups are the Mailbox/BBS Group, TCP/IP Group, and the TexNet Support Group. TPRS hopes that these working groups will help promote information exchange in their respected areas in Texas. New working groups are formed as needed to provide channels for discussion and to help provide direction for that area of digital communications. Anyone can participate in a working group; TPRS membership is not required.

TexNet

TPRS has established a digital packet network protocol, a standard hardware package for the network nodes, and software modules that implement the TexNet network.

The basic design philosophy of TexNet is an open, inexpensive, multi-resource, high speed ‘backbone’ with access through multi-connect capable local nodes. On the high speed side, TexNet is a 9600 baud network system. For local access, compatibility with the typical 2 meter AX.25, 1200 baud, AFSK/FM station is the operational norm. Other baud rates and modulation techniques can be supported on the primary user port or secondary port. The system is totally compatible with both versions of the AX.25 protocol specifications for user connections. With these general specifications, TexNet has been designed and tested to enable all users to take advantage of this high speed, full protocol protected packet network system.

Each node offers, in addition to TexNet access, local area digipeater service, 2 conference bridges for full protocol protected roundtable or net operation, a full mult-connect, multi-user mailbox system, a local console for installation and maintenance setups, a debugger module for long distance and local software monitoring,and an interface for a weather information server for regional weather information, if available.

The NCP-PC (TexNet for PC) creates a direct interface to the PC platform. The Z80 based PC card supports 4 channels for communications. This co-processor approach allows the AX.25 and TexNet-IP to run on the card without affecting the PC. This allows the full power of the PC to be used for network applications. The versatility of this board is only now being developed and applications are endless.

The TexNet Network

The Texas TexNet network system has been operational since October 1986. When fully operational, the network reaches from the border of Mexico to Missouri. Use of the Texas TexNet system is open to all amateur operators. TPRS has been coordinating the installation of the Texas TexNet system. Further expansion of the system depends entirely upon the amateur community.

INFORMATION

TPRS is interested in spreading our information and research efforts as widely as possible. We want other groups involved with packet efforts to get in contact with us. We will provide information for those amateur packet groups that are interested in this system for their areas. If you would like more information concerning TPRS or TexNet, please drop a letter to:

Texas Packet Radio Society, Inc.
P. O. Box 50238
Denton, Texas 76206-0238

TPRS MEMBERSHIP

TPRS membership is widespread with most members located in Texas, but members are located in other states and in foreign countries. Membership is open to any interested person. If you are interested in becoming a member and receiving the TPRS Quaterly, please send your name, address and call with membership dues of $12 per year. A membership application is available elsewhere in this issue.

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mal delay on the radio link. The underlying XINU kernel that we have chosen in fact offers prioritized queuing as a kernel service. Thus we feel that straight-forward modifications to the TCP/IP system calls in our stack may allow for differentiated queuing on the stack that's in the FHSS radio software. Less clear, however, will be how the PC that is operating the multimedia services will tag the various packets as to their service type. We can hope that future versions of WINSOCK will add DiffSERV to the TCP/IP stack, and will endow the multimedia applications with the ability to utilize these capabilities. Then we'll have to modify our XINU TCP/IP code to recognize these QoS bits in the packets, and differentially queue the traffic.

Two general protocols to handle multimedia protocols have been emerging, one is H.323, which was developed in the ITU (International Telecommunications Union), and another is called SIP (Session Initiation Protocol) which has arisen in the IETF. The Microsoft Net Meeting package that runs on Windows uses H.323. These protocols allow for the PC's on either end of the multimedia connection to negotiate protocols, coding rates, formats, etc. They also allow translation of IP addresses to telephone numbers, etc. Some pretty heavy-duty stuff.

What we want to show at Hamcom is what multimedia applications on PC's look like when the IP network achieves adequate performance (unlike today's Internet, but more like tomorrow's QoS-aware Internet). And secondly, how spread spectrum radio might provide that kind of performance for IP traffic, and the features and capabilities it will need for multimedia communications.

-30-

IP Subnetting, Part 2

Tom McDermott, N5EG

```
              32      24       16      8      0
CLASS-A   | Ntwk # |      Host #               |
CLASS-B   | Network #       |     Host #      |
CLASS-C   |  Network #               | Host# |
```

Early on, the above differentiation and partitioning was sufficient, but with the growth of the Internet, many addresses were wasted (by, for example a large corporation with a class-B address, that did not in fact have 65,536 hosts (or anywhere near that many hosts). Eventually, the classification of address types was augmented with a more flexible addressing system known as sub-network addressing. Sub-netting allows allocating an arbitrary number of bits to the network field (as thus the balance to the host field). The method of specifying the number of bits allocated to each field is to use a sub-network mask, or "subnet mask". A subnet mask corresponding exactly to a class-C address would have the value: 11111111.11111111.11111111.00000000, or 255.255.255.0 in dotted-decimal form. The 24 leading one-bits specify that there are 24 bits in the network portion, and 8 bits in the host portion. A subnet mask corresponding to a class-A address would be 255.0.0.0, meaning that only the first 8 bits of the address correspond to the network field.

A subnet mask has two practical implications: first, that many more networks of smaller size are possible, and second that a single class-C address assigned administratively can be broken into many smaller physical networks. For example if you had an assignment of a class-C IP address 192.37.24.*, without subnetting, you could have one physical network with 254 hosts on it (remember, we can't use host numbers of 0 or 255). But practically, you may want to have 16 different networks, each of which could have up to 14 hosts on it. Thus, for your network, you could

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use a subnet mask of 255.255.255.240. Meaning that the first 28 bits are network, and the last 4 bits are host number.

In practical terms, your host looks at the subnet mask and the destination IP address to decide whether the desired target host is directly reachable or not. If the IP address of the destination exactly matches your host's destination address *when logically anded with the subnet mask,* then the destination is on the same network as your host, and your host can directly send the IP packet to the destination. If the destination is on a different network, then your host must instead send the IP packet to a router (a gateway). For example: assume your host has an IP address of 192.10.12.3 and a subnet mask of 255.255.255.240.

Then if the destination has an IP address of 192.10.12.14, the destination is directly reachable. If the destination IP address was 192.10.12.17, then the destination is not directly reachable, and instead your host sends the packet to the gateway.

```
Our IP addr   11000000.00001010.00001100.00000011  (192.10.12.3)
Subnet mask 11111111.11111111.11111111.11110000  (255.255.255.240)
Logical-and   11000000.00001010.00001100.00000000  (192.10.12.0)

Target IP       11000000.00001010.00001100.00001110  (192.10.12.14)
Subnet mask 11111111.11111111.11111111.11110000  (255.255.255.240)
Logical-and   11000000.00001010.00001100.00000000  (192.10.12.0)
```

In this case the logical-and of the target address (192.10.12.0) is the same as the logical-and of our own address (192.10.12.0), thus the target is directly reachable.

```
Target IP       11000000.00001010.00001100.00010001  (192.10.12.17)
Subnet mask 11111111.11111111.11111111.11110000  (255.255.255.240)
Logical-and   11000000.00001010.00001100.00010000  (192.10.12.16)
```

In this case the logical-and (192.10.12.16) is different than our own IP address logically-anded with the subnet mask (192.10.12.0), and thus the target is not directly reachable. The packet is instead sent to the gateway (router).

Subnet addressing provides a great deal of flexibility in breaking up the Internet address space into smaller, more fully utilized chunks, and the subnet mask helps our host identify whether or not the destination host is directly reachable.

Nominations Solicited for TPRS Directors

In accordance with the bylaws, TPRS hereby solicits nominations for directors of TPRS, Inc. Three (3) posiitons are open for the term June 1999 - June 2001. Both the director candidates and those who nominate director candidates must be members of TPRS, Inc.

You can submit nominations several different ways:

- Via email to n5eg@tapr.org
- In person at the TPRS annual business meeting at Hamcom, Arlington, Tx, Saturday, June 12th, 1999, 12:15 PM.
- Via postal mail to:
  Texas Packet Radio Society, Inc.
  P.O. Box 50238
  Denton, Texas 76206-0238

Please indicate the name and address of the person you are nominating, and your name and address. If you mail the nomination in, please be sure it arrives no later than June 1, 1999.

Use the form below, or any form containting the equivalent information:

TPRS, Inc Director Nomination

Name of nominee________________________

Address of nominee ______________________

City, State, Zip ___________________________

Callsign________________________________

Name of nominator_______________________

Address of nominator______________________

City, State, Zip ___________________________

Callsign________________________________

Texas House Bill 1345 Signed into Law

Governor Bush signed Texas House Bill 1345 into law this last week. The law requires that municipal and county zoning ordinances enacted within Texas adhere to the Federal Communications Commission (FCC) federal antenna pre-emption ordinance, PRB-1, which requires that zoning reasonably allow amateur radio operators to antennas and towers of height and size necessary to effectively conduct communications.

Note that Conditions, Covenants and Restriuctions (CCR's) are not covered by this premeption. CCR's are limitations voluntarilty agreed upon normally by people purchasing a home or dwelling and the builder of the subdivision. Zoning deals with restrictions imposed by a governmental agency. The full text (which is rather short) of the bill is below. Exceptions for historical districts, etc. are also allowed under the act.

By Gray H.B. No. 1345

A BILL TO BE ENTITLED

AN ACT

relating to municipal or county regulation on the placing, screening, or height of amateur radio antennas.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

SECTION 1. Chapter 250, Local Government Code, is amended by adding Section 250.002 to read as follows:

Sec. 250.002. REGULATION OF AMATEUR RADIO ANTENNAS. (a) A municipality or county may not enact or enforce an ordinance or order that does not comply with the ruling of the Federal Communications Commission in "Amateur Radio Preemption, 101 FCC 2nd 952 (1985)" or a regulation related to amateur radio service adopted under 47 C.F.R. Part 97.

(b) If a municipality or county adopts an ordinance or order involving the placement, screening, or height of an amateur radio antenna based on health, safety, or aesthetic conditions, the ordinance or order must:

(1) reasonably accommodate amateur communications; and

(2) represent the minimal practicable regulation to accomplish the municipality's or county's legitimate purpose.

(c) This section does not prohibit an architectural or historical district established under law from taking any action that the district may take under law.

SECTION 2. The importance of this legislation and the crowded condition of the calendars in both houses create an emergency and an imperative public necessity that the constitutional rule requiring bills to be read on three several days in each house be suspended, and this rule is hereby suspended, and that this Act take effect and be in force from and after its passage, and it is so enacted.

Updated Club Deascription for the Texas Packet Radio Society, Inc.

Since TPRS was started in 1985, the complexion and nature of people in the amateur radio community (the demographics) has changed substantially. It was decided this year that the club description of TPRS, Inc. would be updated to reflect these changes. These changes were submitted to the Hamcom newsletter, and were printed in the newsletter distributed this last week. Below is the revised statement. In some ways, these statements are always a work-in-progress.

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Club Description
Texas Packet Radio Society, Inc.

TPRS was founded in 1985, and incorporated in 1986 as an educational, public service, and scientific research non-profit corporation [501(c)3] in the state of Texas. The Texas Packet Radio Society goals are:

1 - To design and research amateur radio packet networks,
2 - To provide education in the area of general packet usage,
3 - To provide an emergency communication service network.

TPRS maintains a database of various digipeaters, nodes, and BBS systems located in Texas. These are available on our web site at http://www.tprs.com The club has members throughout Texas, many states, and several foreign countries. The yearly general business meeting is held at Hamcom on Saturday. A Digital symposium is held in Austin in the fall, discussing detailed technical, operational, and organizational aspects of computer networking, packet radio, and TPRS.

TPRS is now conducting research of high-speed local access technologies, utilizing the Internet and Spread-Spectrum techniques to provide multimedia communications and internetworking with advanced computer networks. We conduct seminars on Linux, TCP/IP, IP bridging, switching, and routing, and other relevant technologies that aid the provision of high-speed local access. Our goal is to provide both equipment and training to further educate our membership in advanced networking technology, and to provide education and research results in advanced networking technology for amateur radio. We aim to provide relevance for amateurs who increasingly are employed in the information technology field, and whose livelihood is dependent on technical training and expertise in Information Technology (IT).

TexNet - The TexNet packet network consists of a digital packet network protocol, a standard hardware package for the network nodes, and software modules. On the high speed side, TexNet is a 9600 baud network system. For local access, compatibility with the typical 2 meter AX.25, 1200 baud, AFSK/FM station is the operational norm. The system is totally compatible with the AX.25 protocol specifications for user connections. Each node offers, in addition to TexNet access, local area digipeater service, 2 conference bridges for full protocol protected roundtable or net operation, a full multi-connect, multi-user mailbox system, and an interface for a weather information server for regional weather information (as available). Use of the Texas TexNet system is open to all amateur operators.

TPRS has not yet updated the plans for the next generation of packet radio network technologies, as those technical developments are still in progress. How Texnet 2 and Texnet will co-exist and co-operate have yet to be fully determined, and remains the subject of on-going research.

However the presentation at Hamcom illustrates one direction for the future amateur technologies to follow, one that many feel is promising in terms of amateur and technical interest, and one that is promising in terms of it’s ability to provide much needed services and emergency communications capabilities.

TPRS Node Assigments
Official Publication: June, 1995
Subject to Corrections/Additions/Deletions.

X = ACTIVE/COMPLETED
T = ACTIVE/TEST
P = PENDING

Nr	Status	City/Town	Alias	Call	User Port	Remarks
1	X	Dallas	TEXNET	WR5C	145.05	PMS
2	T	Richardson	TESTBED	W9DDD	None	R&D
3	T	Richardson	RICH	W9DDD	None	R&D
4	X	Murphy	MURPHY	N5EG	145.09	
5	X	Ft. Worth	NWS	N5HCO	None	Weather PMS
6						
7	P	Beorne	BEORNE	N5VUO	145.01	(Bridged w/BNE THENET)
8	X	Geronimo	GERONMO	WB5NSN	145.07	PMS (AKA GERLNK)
9	X	Austin	AUSTIN	WA5LHS	145.07	
10	T	Austin	NQ9Q	Bryan Stroud Test Node		
11	X	San Antonio	ALAMO	N0CCW	145.09/223.44	
12	X	San Antonio	SALAMO	WA2MCT	Interface to SNS/NO USER PORT	
13	X	Denton	DENTON	W5NGU	145.03	
14	X	Lubbock	LUBBOCK	W5ERO	145.05	
15	X	Midland	MIDLAND	WB5RXA	145.05	
16	X	Greenville	GREENVL	WB5IZL	145.07	
17	X	Midland	MAFDXC	WF5E	223.58	DXCluster port 2
18	T	Austin	NQ9Q	Bryan Stroud Test Node		
19	X	Rockport	ROCPRT	N5JKH	144.99/PORT 2 446.1	
20	X	C. Christi	CORPUS	N5XCH	145.05	INTERFACE TO SNS
21	X	Pettus	PETTUS	KA5BWL	147.56	
22	T	Corpus	ESTES	KB5GD	None	Test Node
23	X	Lubbock	LBBDXC	KA5EJX	DXCLUSTER	
24	X	Austin	AUSDXC	WB5VZL	144.99	
25	P	Corpus Ch	CCSU	N5AHD	TEXT Node	
26	X	Victoria	VCTRIA	W5DSC	145.01	
27	X	Alice	ALICE	K5DYY	145.07	
28	X	Amarillo	AMARILO	WD5ILA	145.05	
29	X	Abilene	ABILENE	WB5EKW	145.05	
30						
31	P	Houston	HOUSTON	WD5HJP	UNKN	Due ???
32	P	Pearland	PEARL	UNKN	UNKN	Due ???
33	P	Rosenburg	ROSBRG	UNKN	UNKN	Due ???
34	X	San Antonio	SANTEX	WB5FNZ	223.58	
40	P	Hempstead	HMPSTD			Due ???
41						
42	X	Kingsville	TAMUK	W5ZD	144.91	(aka KINGVL)
43	P	Bryan/CollStn	SBRAZOS	KF5LN	145.05/446.10	Port 0 (PENDING RE-INSTALLATION)
44	P	Bryan/CollStn	NBRAZOS	KG5ZD	446.1	(See Nr 43)
45	X	Fannin County	FANNIN	WB5RDD	145.05	
46	X	Sherman	SHERMAN	WB5CVR	144.93	
47	X	South Dallas	SDALLAS	KF5RN	None	
48	X	Waco	WACO	WD5KAL	145.09	
49	X	Falfurrias	FALFUR	WB5FRO	None	

50	X	Mercedes	VALLEY	NA5C	144.60	DXCluster port 2
51	X	San Isidro	ISIDRO	K5RAV	None	
52	P	Brownsville	BROWX	K5RAV-?	NWS node 25.54.57N 97.25.08W	
73	X	Fort Worth	FTWORTH	N5AUX	144.99	
80	T	AOHTST	AUSTIN	WB5AOH	NONE	R&D AUSTIN
98	X	Murphy	CARDNAL	WA6ROC	None	R&D/PMS/NMS/NETCON

(100-150) Reserved for TexLink Node Usage

105	X	Floresville	FLORES	WD5DOE	None	
106						
107	X	King Mountain	KINGLNK	WB5YHC	145.05	
108	X	Alpine	ALPINE	WA5ROE	145.05	
109	X	Refugio	REFUGIO	WB5OLT	None	
110	X	San Angelo	ANGELO	WA5JSN	145.05	
111						
112	P	PLAINVIEW	PLVLNK	KC5ALN	145.05	
113						
114		Reserved - WB5DDP				
115		Reserved - WB5DDP				
116						
118		Moody	MOODY	W5ZDN	None	
119						
120						
121						
122						

(151-249) Reserved for Non-Texas Node Usage

160	X	Ft Gibson OK	FTGIBSN	N5GIT	145.01	
161	X	Muskogee OK	MKOTST	WA5VMS	446.5	PMS
162	X	Muskogee OK	MUSKOGE	W5EJK	145.09	
163						
164	X	Lincoln AR	FAYETVL	K5VR	145.69	
165	X	Clayton OK	CLAYTON	W5CUQ	145.03	
166	X	Ft Smith AR	FTSMITH	W5ANR	144.91	
167						
169	X	Tulsa OK	TULWX	N5WX	NWS WX Server	
172	X	Okemah OK	OKEMAH	WB5HLR	145.69	
173	X	Choctaw OK	CHOCTAW	AB5H	145.69	
174						
175	X	Garfield AR	GARFLD	WB2ROC	None	
176	X	Aurora Missouri	OARSMO	K0SQS	145.05	
177	X	Mt Magazine AR	MAGAZIN	KF5XB	144.95	
178	X	Russelville	RSLVL	WB5BHS	UNKN	
179	X	Little Rock AR	LROCK	WB5SQK	144.97	PORT 2 446.50(FUTURE)
209	T	Little Rock AR	LRTST	KA5SQK	TEST Node	

(250-255) Network Reserve

If you are a TexNet node opearator/owner and have a correction to make to the list, advise to N0CCW@K3WGF.#STX.TX.USA.NOAM, or leave a message for N0CCW on the NDALLAS PMS of TexNet.

TPRS Membership Application

Name ______________________________ Callsign _______________
Address ____
Apt. or Mailstop ____________________
City/State ____
Zip _______________________ E-mail address ___________________
Evening Phone (   ) ___________ Work Phone (   ) _____________

Membership is $12 per year. How many years are you paying for? ____

☐ New Member ☐ Renewal

Make check payable to: Texas Packet Radio Society

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ATTN:
Membership

Texas Packet Radio Society
P.O. Box 50238
Denton, Texas 76206-0238

Texas Packet Radio Society, Inc.

HAM-COM Schedule

IP Subnetting, Part 2

House Bill 1345

Be sure to visit the TPRS web page:
http://www.tprs.org
for the latest information on TPRS activities.

A current listing of Packet nodes, frequencies, and networks is located in the **North American Digital Systems Directory (NADSD) on-line at:**
http://www.tapr.org/directory/index.html

Texas Packet Radio Society
P.O. Box 50238
Denton, Texas 76206-0238

ADDRESS CORRECTION REQUESTED

To: